

MWI 6410.1

REVISION C

EFFECTIVE DATE: February 18, 2004

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MARSHALL WORK INSTRUCTION

AD01

PACKAGING, HANDLING, AND MOVING PROGRAM CRITICAL HARDWARE

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		5/14/99	Document converted from MSFC-P15.1-CO1 to a Directive. Previous history retained in system as part of canceled or superseded ISO Document files.
Revision	A	8/20/99	Document updated to reflect new MSFC reorganization.
Revision	B	1/24/01	Clarify requirements for PHTR and Critical Item Label. Updated numbering per MPG 1410.2; deleted "...and Mission Sensitive Hardware (MSH)" from section 1, Purpose; changed "MPG 1441.1" to "MPG 1440.2" and changed "MPG 1700.1" to "MPG 8715.1" in section 3, Applicable Documents; added MPG 8730.3 and MWI 3410.1 to Applicable Documents; removed item g. from section 5, Definitions; added "Redlines to the As Run handling/moving plans must be concurred by a representative from each signing organization. Also, the redlines must be documented on the Test Procedure Deviation MSFC Form 3959" to paragraph 5.5; deleted sections 5.6 and 5.7; deleted "The MM will assure the use of the PHTR and the NASA Critical Item Label" from the definition for Move Manager; delete definition for Move Report; changed paragraph 5.14 to read "...This document or an equivalent describes the information necessary to move PCH as required by NPG 6000.1 for all Class I items. The handling/moving plan suffices this requirement."; section 6, Instructions, changed to read "For handcarry items, as defined in 5.3, perform the following instructions."; deleted "or MSH" from paragraph 6.1; added "or equivalent" to paragraph 6.2; deleted paragraph 6.3; deleted section "For MSH items..."; added An approved handling/moving plan shall be utilized each time a PCH item is moved unless the item is a handcarry. For PCH items, as defined in 5.12, perform the following instructions."; added item 6.5; deleted paragraph 6.20.1.c; added "Assure that shipments of PCH to/from MSFC are coordinated with the PCH/PE" to paragraph 6.20.1.3; deleted paragraphs 6.20.1.f, h, and j"; added 6.20.1.8(4); added paragraph 6.20.1.15; deleted "The degree of S&MA coverage will be determined on a program by program basis by the PCH project Engineer and the Industrial Safety Lead" from paragraph 6.20.2.1; deleted "A permanent record of completed handling/moving plans shall be impounded by the responsible quality organization for a minimum of 3 years" from paragraph 6.20.2.2; deleted paragraph 6.20.3.c.10 and 11; changed 6.20.3.3.i to read "...certifications. In conjunction with S&MA conduct audits of prime and support contractors upon the request of the MLR"; added 6.20.3.3.m;

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			deleted paragraph 6.20.3.e.3; deleted 6.20.3.f.6; changed "MPG 1700.1" in section 8 to "MPG 8715.1"; changed section 9, Records to read "...by S&MA will be maintained by the MLR for 3..."; and changed "MPG 1700.1" in section 10 to "MWI 3410.1".
Revision	C	2/18/2004	Renamed NSS/GO 1740.9 to NASA-STD-8719.9, "Safety Standard for Lifting Devices and Equipment" Section 6.20.3.5 changed "Property Management Group" to "Transportation and Logistics Engineering Group"

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1. PURPOSE

This Marshall Work Instruction (MWI) establishes instructions for implementation of handling/moving plans to prevent damage to Program Critical Hardware (PCH).

2. APPLICABILITY

This work instruction applies to MSFC organizations and contractors involved in all aspects of packaging, handling, or moving PCH related to any program or project for which MSFC has responsibility or assignment.

3. APPLICABLE DOCUMENTS

- 3.1 MPG 1440.2, "MSFC Records Management Program"
- 3.2 MPG 8715.1, "Marshall Safety, Health, and Environmental (SHE) Program"
- 3.3 MPG 8730.3, "Control of Nonconforming Product"
- 3.4 MWI 3410.1, "Personnel Certification Program"
- 3.5 MWI 6000.1, "Procurement Traffic Management and Freight Traffic Actions"
- 3.6 MWI 6430.1, "Lifting Equipment and Operations"
- 3.7 MSFC-STD-126, "Inspection, Maintenance, Proof Testing, and Certification of Handling Equipment"
- 3.8 NPR 6000.1, "Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment and Associated Components"
- 3.9 NPR 6200.1, "NASA Transportation and General Traffic Management"
- 3.10 NASA-STD-8719.9, "Safety Standard for Lifting Devices and Equipment"

4. REFERENCES

None

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5. DEFINITIONS

5.1 Acronyms

- 5.1.1 CO Center Operations Directorate
- 5.1.2 COSS Center Operations Support Services
- 5.1.3 FED Facilities Engineering Department
- 5.1.4 MLR Marshall Lead Representative
- 5.1.5 MM Move Manager
- 5.1.6 MSFC Marshall Space Flight Center
- 5.1.7 MTR MLR Technical Representative
- 5.1.8 PCH Program Critical Hardware
- 5.1.9 PCH/PE PCH Project Engineer
- 5.1.10 PH Product Handler
- 5.1.11 PHTR Packaging, Handling, and Transportation Record
- 5.1.12 S&MA Safety and Mission Assurance Office
- 5.1.13 TPS Test Preparation Sheet

5.2 Class I, II. See 5.12.3, PCH.

5.3 Hand-carry. Items which are a maximum of 35 pounds and smaller than 25" by 25" by 25", and can be moved by one person. The item must be in the possession of the person performing the handcarry at all times. An item not meeting these criteria may also be considered a hand-carry if it can be moved by one person and a waiver is signed by the PCH/PE and MLR.

5.4 Handling/Moving. Processing, arranging, installing, aligning, lifting (manually or using hoisting equipment), loading, or similar operations performed with or upon hardware during its lifetime. Transporting, towing, shipping, and/or other similar operations involved in transfer of hardware from one location to another.

5.5 Handling/Moving Plan. A document that provides a sequence of steps, preparatory and operational, for conducting a

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handling/moving operation for PCH. All types of plans including Generic Handling/Moving Plan, TPS, and the Formal Handling/Moving Plan will address the basic requirements such as equipment (according to NASA-STD-8719.9, MSFC-STD-126 and MWI 6430.1), personnel (according to MWI 3410.1) safety/quality aspects, and specific operational steps. Plans may exist in one of the following formats depending on its purpose of application. Redlines to the As Run handling/moving plans must be concurred by a representative from each signing organization. Also, the redlines must be documented on the Test Procedure Deviation MSFC Form 3959.

5.5.1 Generic Handling/Moving Plan. A plan dedicated to the limited aspects of handling/moving PCH items at MSFC. This is a stand-alone document that can be reused for similar hardware and operations. This document must be signed by the PCH/PE.

5.5.2 Test Preparation Sheet (TPS) (MSFC Form 248). A detailed handling plan used during the course of hardware testing within the functional perimeter of MSFC's Engineering Laboratories and which addresses a single or very limited handling/moving operation which is made in direct support of a test operation. The minimum approval signatures are the PCH/PE, MM, and S&MA.

5.5.3 Formal Handling/Moving Plan. A document used to implement the requirements of handling/moving a PCH item that is outsized or has unique parameters to be addressed such as size, weight, limitations of vibration, acceleration, humidity, temperature, and other environmental/handling criteria. The minimum approval signatures are PCH/PE, MLR, S&MA, and Representative of the COSS contractor when the COSS contractor performs the operations.

5.6 Mission Essential. An item of equipment or part for which the lack of immediate issue on-call at the demand source would adversely affect program/project schedules, safety, or reliability.

5.7 Move Manager (MM). The responsible civil service person will assure the physical handling/moving of PCH by his/her respective organization. The MM shall monitor movements of PCH.

5.8 NASA Critical Item Label. A standardized distinctive label/tag prominently displayed on or near (but not permanently affixed to flight items) PCH and on the interior and exterior packages and shipping containers. The purpose of the label is to alert all personnel handling and shipping such hardware of its criticality to the program effort. The NASA Critical Item Label

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will be obtained through supply channels. The label form numbers and sizes are:

- 5.8.1 NASA Form 1368 8 by 4 inches
- 5.8.2 NASA Form 1368A 6 by 3 inches
- 5.8.3 NASA Form 1368B 3 1/2 by 2 inches
- 5.8.4 MSFC Tag 3 5 1/4 by 2 1/2 inches

5.9 Outsized. Any product that is greater than 10,000 pounds or products that are of configurations which cannot be readily handled with conventional material handling equipment.

5.10 Packaging. Application or use of adequate protective measures to prevent damage from physical hazards or conditions including: wrappings for protection from physical danger, cushioning interior containers, and complete identification marking of unit and intermediate packages or containers.

5.11 Packaging, Handling, and Transportation Record (PHTR) (NASA Form 1426). This document or an equivalent describes the information necessary to move PCH as required by NPR 6000.1 for all Class I items. The handling/moving plan suffices this requirement.

5.12 Program Critical Hardware (PCH). Those items meeting one or more of the criteria listed below:

5.12.1 An item which supports the critical path in the program schedule and the loss, damage, or delay of which would seriously impact program schedules.

5.12.2 Assemblies with close tolerances of delicate construction, which could be damaged by improper handling, and such resulting damage could compromise a flight vehicle, payload, or the safety of personnel regardless of whether the item is considered "Flight Hardware."

5.12.3 Those items designated as Class I or II hardware defined in NPR 6000.1. Class I: Mission-essential items which, in the event of loss, damage, or delay in shipment, would seriously affect the program. Class II: Delicate or sensitive items not covered by Class I or Class III. These items are those that are damaged readily by improper handling.

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5.12.4 This definition is meant to generally exclude raw materials and basic hardware such as nuts, bolts, brackets, and electronic piece parts which will be consumed or become part of an item which would be covered by 5.12.1 or 5.12.2 above.

6. INSTRUCTIONS

For handcarry items, as defined in 5.3, perform the following instructions.

<u>Actionee</u>	<u>Action</u>
MLR	6.1 Identify items as PCH.
	6.2 Prepare PHTR or equivalent.
PH/MLR	6.3 Verify personnel are PCH certified.
	6.4 Move item.

An approved handling/moving plan shall be utilized each time a PCH item is moved unless the item is a handcarry. For PCH items, as defined in 5.12, perform the following instructions.

<u>Actionee</u>	<u>Action</u>
MLR	6.5 Identify items as PCH.
	6.6 If item is outsized, designate MTR. Contact PCH/PE.
PCH/PE	6.7 Provide MTR/MLR detailed handling/moving plan format.
MLR/MTR	6.8 Prepare handling/moving plan.
PCH/PE	6.9 Coordinate handling/moving plan review.
S&MA, FED COSS contractor	6.10 Review handling/moving plan. Make initial plans for move as necessary.
MLR/MTR	6.11 MTR update handling/moving plan and resolve issues with handling/moving plan as necessary.
PCH/PE	6.12 Conduct tabletop review of handling/moving plan prior to move.

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MLR/MTR, 6.13 Implement handling/moving plan.
PCH/PE, S&MA,
CO, Protective
Services Dept

6.20 Responsibilities

6.20.1 Directors/Managers (i.e. MLR) will:

6.20.1.1 Assure MSFC/contractor organizations identify/designate PCH as defined in this document. Deviations to those requirements will be allowed only with agreement of the representatives of MLR and PCH/PE.

6.20.1.2 Assure that the responsibility interfaces are established between prime contractors and MSFC for handling PCH when delivered to MSFC.

6.20.1.3 Assure that the required handling/moving plans are being addressed and notify the PCH/PE of the specific timeframe for the planned activity. Assure that shipments of PCH to/from MSFC are coordinated with the PCH/PE.

6.20.1.4 Assure that the organizational and/or functional intent of this document is established for each project by civil service personnel or contractors at MSFC and contractor plants.

6.20.1.5 Assure that the design and fabrication requirements include the preparation and implementation of detailed handling/moving plans for the hardware.

6.20.1.6 Assure that the plans have details for packaging, handling, and moving PCH which comply with the intent of this document. The handling/moving plans will include in-plant handling as well as final destination shipment.

6.20.1.7 Assure accidents or incidents involving PCH are reported in accordance with the latest edition of MPG 8715.1 and MPG 8730.3.

6.20.1.8 Provide the requirements for handling/moving of PCH to include: (1) specific handling operations, (2) unique handling equipment for each operation, (3) the preparation and approval of handling/moving plans at MSFC, and/or (4) the preparation of the PHTR or equivalent for each item of PCH to be moved. This responsibility encompasses MSFC and offsite contractor efforts to assure that all elements understand and accomplish assigned function, all equipment and handling/moving plans are available

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to support program schedules and handling/moving problems are promptly identified and resolved.

6.20.1.9 Design or review and approve the design of all special loading and handling equipment, test fixtures, special shipping containers, tooling, and support hardware required in the off-loading, loading, transporting, and installation of PCH.

6.20.1.10 Technically manage and physically perform, using certified personnel/equipment, the handling/moving and assembly of PCH within the organization's operational perimeters (test stands, test fixtures, buildings, etc.) whenever the move is incidental to the test or work being performed on the hardware.

6.20.1.11 Provide a civil service MM for those handling/moving operations which do not require FED COSS contractor support. The MM shall monitor movements of PCH.

6.20.1.12 Assure that all equipment used by the Director/Manager's organization for lifting and handling of PCH is tested and operated in accordance with MSFC-STD-126, NASA-STD-8719.9 and MWI 6430.1.

6.20.1.13 For contractor-developed hardware, assure that procurement specifications contain the requirement for preparation and implementation of detailed handling/moving plans.

6.20.1.14 Utilize the services of S&MA and, if required, the PCH/PE in the development of the required handling/moving plans and techniques to assure the maximum consideration of the safety of personnel and material is observed.

6.20.1.15 A permanent record of completed handling/moving plans shall be impounded by the MLR for a minimum of 3 years in accordance with MPG 1440.2.

6.20.2 Director, Safety and Mission Assurance Office (S&MA),
will:

6.20.2.1 Provide advice and assistance to Center organizations on the safety and quality aspects of the design and operational activities involved in packaging, handling, and moving PCH such as Hazard Analysis and equipment waivers. S&MA shall monitor, as required, all PCH operations on a real-time basis.

6.20.2.2 Review and concur in the handling/moving plans for PCH. Assure the adequacy and compliance of procedural steps on a real-time basis.

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6.20.2.3 Develop and implement in conjunction with CO personnel the training and certification of all personnel involved in packaging, handling, and moving PCH. Perform certifying officer function to certify all MSFC personnel involved in packaging, handling, and/or moving PCH hardware in accordance with the approved criteria. An updated listing of certified personnel will be made available upon request.

6.20.3 Director, Center Operations Directorate (CO), will:

6.20.3.1 Appoint a PCH/PE to administer the requirements of this document, develop implementation plan for management and handling of PCH at MSFC, and approve any detailed handling/moving plans for this hardware.

6.20.3.2 Assure that all contracts which involve the procurement of PCH contain appropriate provisions to assure contractor compliance with the intent of this document and that such contracts require that all documentation be conspicuously marked "PROGRAM CRITICAL HARDWARE." Through the auspices of the Program/Project Office Manager, assure that prime contractors establish packaging, handling, and moving plans consistent with the guidelines provided in this document. These handling/moving plans will include intra-plant as well as offsite shipments.

6.20.3.3 PCH Project Engineer (PCH/PE) will:

a. Serve as the MSFC Central Point of Contact for all PCH operations.

b. Certify completion of PCH Orientation for all personnel involved in PCH moving/handling operations at all MSFC facilities or worksites.

c. Assist in the determination of the modes of transportation available that satisfy the PCH transportation requirements specified.

d. Maintain cognizance of all PCH handling/moving operations at all MSFC facilities or worksites.

e. Coordinate PCH moves at MSFC. Coordinate the pickup and delivery of PCH at local contractor's facilities.

f. Maintain real-time cognizance over maintenance, operation, testing, and certification of lifting and handling equipment used in a specific PCH handling/moving operation.

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g. Upon request from MLR, assist in the preparation of the PCH handling/move plan, initiate work orders, and coordinate all activities necessary for PCH operations.

h. Coordinate and approve PCH handling/moving plans.

i. Review outside contractors' PCH handling/moving plans.

j. Provide MLR support in reviewing, evaluating, and investigating adequacy and/or mishaps associated with the prime or support contractors in the area of PCH handling and certifications. In conjunction with S&MA, conduct audits of prime and support contractors upon the request of the MLR.

k. Ascertain the escorts needed for the move by taking into consideration the size of the item, route to be traveled, and the sensitivity of the item.

l. Serve as MM and technical monitor for all PCH operations requiring the services of the COSS contractor.

m. Provide assistance with Non-PCH hardware moves when requested by the MLR.

6.20.3.4 Logistics Services Department will assist the MLR in the interpretation and contractual application of MSFC standards, NASA standards and specifications, and other applicable specifications on packaging, marking, handling, and moving PCH.

6.20.3.5 Transportation and Logistics Engineering Group will:

a. Provide special conveyance at designated docking area ready for cargo loading and unloading.

b. Coordinate receipt and delivery of incoming PCH at MSFC.

c. Provide certified personnel and equipment. Assure that all equipment used in lifting and handling of PCH is tested and operated in accordance with MSFC-STD-126, NASA-STD-8719.9 and MWI 6430.1.

d. Physically perform handling/moving operations when PCH materials are received, shipped, and delivered (distributed at MSFC).

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e. Provide a properly trained packaging crew and associated equipment to package PCH. Handle/move PCH during crating/packing and shipping operations.

f. Assure hardware has been completely prepared for shipment and secured aboard the special conveyance in accordance with approved handling/moving plans.

g. Maintain, test, and certify all mobile handling equipment in accordance with MSFC-STD-126, NASA-STD-8719.9 and MWI 6430.1.

h. Provide the transportation mode in accordance with program requirements and schedule the carrier within allowable operating limitations in accordance with NPG 6200.1.

i. Provide traffic management support for the administration of contracted PCH moves conducted by carriers on Government Bills of Lading (GBL) in accordance with MWI 6000.1.

6.20.3.6 Facilities Engineering Department (FED) will:

a. Assure that adequate equipment, supplies, and tools are available for the timely performance of the operation. Perform the "hands on" handling/moving of PCH as defined in the handling/moving plans.

b. Assure that support personnel have received adequate training and certification for the assignment being addressed.

c. Assure that the maintenance, test, and certification of all fixed lifting equipment and auxiliary handling equipment in accordance with MSFC-STD-126, NASA-STD-8719.9 and MWI 6430.1. Conduct special test and certification of equipment upon request.

d. Arrange for support for contractual implementation of the intent of this document.

e. Arrange for the review of the draft and final handling/moving plans to be used and assure that they are provided to the support personnel on a timely basis.

6.20.3.7 Protective Services Department will:

a. Support the handling/moving of PCH within MSFC by furnishing security vehicles and personnel as required to afford protection to equipment and operations during the operational time frame of preparation, handling, and transportation by providing escorts and guards.

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- b. Interface with law enforcement and other security organizations and agencies.
- c. Provide security plans as required.
- d. Provide escort for movement of PCH by vehicle through traffic over MSFC roads.
- e. Provide a security representative at locations other than MSFC as requested.

7. NOTES

None

8. SAFETY PRECAUTIONS AND WARNING NOTES

See MPG 8715.1.

9. RECORDS

Final handling/moving plan completed and stamped by S&MA will be maintained by the MLR for 3 years. The handling/moving plan will be archived with the program documentation.

10. PERSONNEL TRAINING AND CERTIFICATION

See MWI 3410.1 for personnel certifications.

11. FLOW DIAGRAM

None

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12. CANCELLATION

MWI 6410.1B dated January 24, 2001

Original signed by
Axel Roth for

David A. King
Director